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PATENT APPLICATION OF:

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SERIAL NO. 09/643,550

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FOR: SOLID POLYMER FUEL CELL WITH IMPROVED VOLTAGE REVERSAL TOLERANCE

GROUP ART UNIT: 1745

EXAMINER: Not yet assigned

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, postage prepaid, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on this date:

January 25, 2001

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INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants submit herewith a copy of each of the following references for consideration in connection with the above application.

U.S. Patent No.	Inventor	Issue Date
4,360,417	Reger et al.	11/82
4,589,969	Yurkov et al.	05/86

Foreign Document No.	Country	Publication Date
59-225740	Japan	12/84
62-024568	Japan	02/87
01-246765	Japan	10/89
09-035736	Japan	02/97
0 716 463	EPO	12/96

Publication	Author(s)	Date
"Evaluation of Materials for A Water Electrolyzer of the Membrane Type", Brown Boveri Research Center, Switzerland, pp. 1799-1808	Stucki et al.	Date unknown
"Kirk-Othmer Encyclopedia of Chemical Technology", 3rd Edition, J. Wiley & Sons, Vol. 10, pp. 248-249		Date unknown
"Optimized CO Tolerant Electrocatalysts for Polymer Electrolyte Fuel Cells, *Electrochemical Society Proceedings*, Vol. 95, pp. 12-23	Iwase et al.	Date unknown

"Conference Paper" *Lewis Research Center, Space Electrochemical Research and Technology,* pp. 139-148 (abstract only)	Swette et al.	Date unknown
"Development of Pressure Electrolyser and Fuel Cell with Polymer Electrolyte," *Int. J. Hydrogen Energy,* Vol. 19, No. 5, pp. 453-455	Ledjeff	1994
"New Materials for Water Electrolysis and Photoelectrolysis", *Hydrogen Energy, World Conference,* pp. 2065-2092	Savadogo	1996
"Regenerative Fuel Cell Subsystems", Chemistry 869, Course in Electrochemistry at Simon Fraser University, pp. 1-12	Author unknown	11/96

"Materials and Approaches for CO and CO_2, Tolerance for Polymer Electrolyte Membrane Fuel Cells", *New Materials for Fuel Cell and Modern Battery Systems II, Proceedings of the Second International Symposium on New Materials for Fuel Cell and Modern Battery Systems,* 11 pages having 2 columns of text per page	Wilkinson et al.	07/97
"Role of Hydrous Ruthenium Oxide in Pt-Ru Direct Methanol Fuel Cell Anode Electrocatalysts: The Importance of Mixed Electron/Proton Conductivity," *Langmuir 15:*774-779	Rolison et al.	1999
"Bifunctional electrodes with a thin catalyst layer for 'unitized' proton exchange membrane regenerative fuel cell", *Journal of Power Sources,* pp. 82-85 (abstract only)	Shao et al.	1999

"Electro-chemical and physico-chemical characterization of carbon-supported and unsupported Pt-Ru catalysts for application in direct methanol fuel cells," *Meeting Abstracts*, Abstract No. 77, Vol. 99-1, 195th Meeting of the Electrochemical Society, Inc.	Arico et al.	05/99

The above references are listed on the enclosed Form PTO-1449 entitled "Information Disclosure Citation."

Concise Explanation of the
Relevance of the Cited References

Reger et al. U.S. Patent No. 4,360,417 discloses a dimensionally stable high surface area anode made of graphite carbon fibers. The carbon fibers have a surface coating of a mixture of crystals. The mixture consists of ruthenium oxide and titanium oxide. The fibrous nature of the anode surface is stated to remove harmful contaminants from waste streams in relatively low concentrations.

Yurkov et al. U.S. Patent No. 4,589,969 discloses an electrode for electrolysis of solutions of electrolytes and

process for producing the electrode. The electrode has a substrate of passivated metal and a coating of materials. The coating consists of a mixture of ruthenium oxide, titanium oxide and tin is predetermined proportions. The electrode is suitable for use in the treatment of wastewater in an electroplating process.

The abstract of Japanese Patent Publication No. 59-225740 discloses an electrode catalyst and preparation in which a coating layer is applied to a conductive substrate comprising of a platinum metal and a compound converted to Ir-oxide, thereby imparting methanol electrooxidizing catalytic activity and durability to the electrode catalyst.

The abstract of Japanese Patent Publication No. 09-035736 discloses a solid polymer fuel cell and its operation in which slurry comprising carbon powder and a water repellent agent is applied to one surface of a carbon porous body and is sintered to form a gas diffusion layer. A gas diffusion layer is formed so that the content of ruthenium in a platinum-ruthenium is specified, thereby retarding the poisoning of the fuel electrode catalyst.

The abstract of Japanese Patent Publication No. 01-246765 discloses an electrode of fuel cell in which cell stability is improved by mixing a small amount of iridium with platinum as an active substance of the catalyst.

The abstract of Japanese Patent Publication No. 62-024568 discloses platinum added with gold and/or iridium to one or both electrodes of an electrochemical fuel cell.

European Patent No. 0716463 A2 discloses a polyelectrolytic fuel cell and method of controlling the operation thereof. The fuel cell comprises stacked unit cells capable of generating electric power from chemical reactions between the fuel and oxidizing gas. The disclosed method detects the output voltage, internal resistance and humidity of oxidizing gas, and adjusts the supply of oxidizing gas when the output voltage, internal resistance and humidity deviate from a previously-set tolerance.

The publication by Stucki entitled "Evaluation of Materials for a Water Electrolyzer of the Membrane Type" discloses problems related to the stability and efficiency of an energy conversion device such as a water electrolyzer. The publication states that the water splitting process should remain unaffected

by the energy conversion process and the energy should be fed and the products removed with a minimum of losses, and the system itself should thereby remain unaffected by the energy conversion process.

Kirk-Othmer "Encyclopedia of Chemical Technology" discloses various film deposition techniques, such as anodic film chromate conversion coatings and electroless plating.

The publication by Iwase entitled "Optimized CO Tolerant Electrocatalysts for Polymer Electrolyte Fuel Cells" discloses a Pt-Ru electrocatalyst having relatively high CO tolerance without changing the amount of electrocatalyst per unit area. The Ru in the PT-Ru electrocatalyst is deduced to absorb H_2O and facilitate the oxidization of CO.

The abstract of Swette et al. "PEM regenerative fuel cells", discloses the progress in developing electrocatalyst systems and electrode structures for the positive electrode of a single-unit solid polymer proton exchange membrane fuel cell.

The 1994 publication by Ledjeff et al. entitled "Development of Pressure Electrolyser and Fuel Cell with Polymer

Electrolyte" discloses various membrane electrode units and the possibility of long-term storage of energy from renewable energy sources through the energy carrier hydrogen.

The 1996 publication by Savadogo entitled "New Materials for Water Electrolysis and Photoelectrolysis" discloses methods of producing hydrogen from water electrolysis in alkaline or acidic medium and also discloses particular electrocatalysts and membranes.

The excerpt from 1996 Chemistry 869 Course in Electrochemistry at Simon Fraser University entitled "Regenerative Fuel Cell Subsystems" discloses research on catalyst and/or electrode structures that operate effectively for both oxygen reduction and oxygen evolution.

The 1997 publication by Wilkinson et al. entitled "Materials and approaches for CO and CO_2 Tolerance for Polymer Electrolyte Membrane Fuel Cells" discloses materials and approaches in fuel cell design and operation for handling reformate and contaminants therein, as well as future related approaches.

The 1999 publication by Rolison et al. entitled "Role of Hydrous Ruthenium Oxide in Pt-Ru Direct Methanol Fuel Cell Anode Electrocatalysts: The Importance of Mixed Electron/Proton Conductivity" discloses Pt-Ru blacks for direct methanol fuel cell electrocatalysts containing quantities of oxidized Ru and hydrous ruthenium oxide that are not bimetallic alloys. Hydrous ruthenium is recommended as a preferred catalytic species.

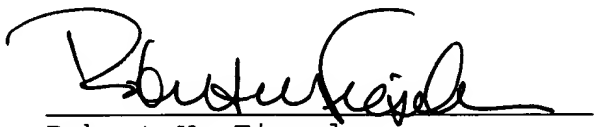
The abstract of the 1999 publication by Shao et al. entitled "Bifunctional electrodes with a thin catalyst layer for unitized proton exchange membrane regenerative fuel cell" discloses a thin catalyst layer that reduces the catalyst loading and reduces mass transport and ohmic limitations.

The 1999 publication by Arico et al. entitled "Electro-chemical and physico-chemical characterization of carbon-supported and unsupported Pt-Ru catalysts for application in direct methanol fuel cells" discloses the morphology and physico-chemical properties of both carbon-supported and unsupported Pt-Ru anodes.

This Information Disclosure Statement is being submitted before receipt of a first Office Action on the merits of the application.

Please charge any fees incurred in connection with this submission to Deposit Account No. 13-0017 in the name of McAndrews, Held & Malloy, Ltd.

Respectfully submitted,



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